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InfoVision Optoelectronics (Kunshan) Co.,LTD.

Document Title	M121MNS1 R1 Product Specification			Page No.	1/26
Document No.		Issue date	2012/10/9	Revision	00

Product Specification

To:

Product Name: M121MNS1 R1

Document Issue Date: 2012/10/9

Customer	InfoVision Optoelectronics
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Revision	Date	Page	Old Description	New Description	Remark
00	2012/10/9	all	--	First issue.	

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1.0 General Descriptions

1.1 Introduction

The M121MNS2 R0 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, a timing controller, voltage reference, common voltage, column driver, and row driver circuit. This TFT LCD has a 12.1-inch diagonally measured active display area with resolution (800 horizontal by 600 vertical pixel array).

1.2 Features

- 12.1" TFT LCD Panel
- LED Backlight System
- Supported (800x600 pixels) resolution
- Aspect ratio: 4:3
- Compatible with RoHS standard

1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	31(12.1inch)Diagonal	cm
Active Area	246.0 (H) x184.5 (V)	mm
Pixel format	800(H) x600(V) (1 pixel=R+G+B dot)	pixel
Pixel Pitch	0.3075(H)×0.3075(V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White	-
White Luminance	350(Min),450(Typ)	cd /m^2
Contrast Ratio	500(Min),800(Typ)	-
Response Time	30typ	msec
Input Voltage	3.3V(Logic),12V(LED)	V
Weight	700 Max	g
Unit outline dimensions(*1)	276.0(W)×209.0(H)×9.1(D)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	262K colors(RGB 6 bit)	-
Surface Treatment	Anti-Glare and hard-coating 3H	-

(*1) excluding the area of the connector cover

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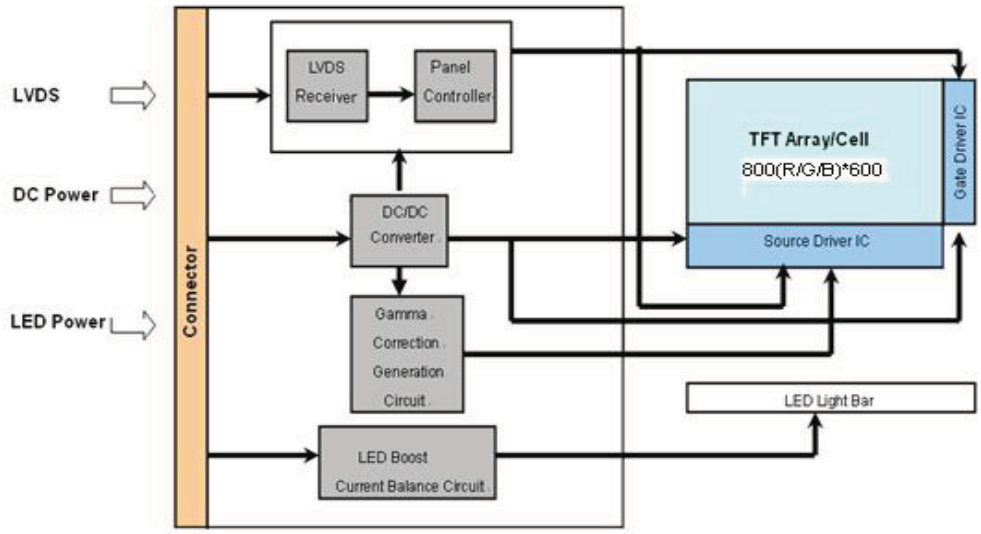
1.4 Functional Block Diagram

The functional block diagram of the LCD module.

Figure 1 Block Diagram



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2.0 Absolute Maximum Ratings

Table 1 Absolute Ratings of Environment

Item	Symbol	Condition	Pin	Ratings	Unit	Remark
Supply Voltage	V_{cc}	Ta=25℃	VCC	-0.3~+4.0	V	Note1,2
	Vdd	Ta=25℃	VDD	-0.3~+15.0	V	Note1,2
Input voltage	V_{I1}	Ta=25℃	RxINi-/+ CK IN-/+	-0.3~Vcc+0.3	V	I=0,1,2
	V_{I2}	Ta=25℃	RL/UD	-0.3~ V_{cc}+0.3	V	
	V_{I4}	Ta=25℃	XSTABY,VBR	-0.3~ V_{DD}	V	
Storage temperature	T_{STG}	-	-	-30~+80	℃	Note1
Operating temperature	T_{OPA}	-	--	-20~+70	℃	Note1,3,4

Note1: Humidity: 95%RH Max. (Ta<=40℃) Note static electricity.
Maximum wet-bulb temperature at 39℃ or less.(Ta>40℃) No condensation.
Note2: The Vcc power supply capacity must use the one of 2A or more.
The Vdd power supply capacity must use the one of 3A or more.
Note3: There is a possibility of causing deterioration in the irregularity and others of the screen and the display fineness though the liquid crystal module doesn't arrive at destruction when using it at 65~70℃. There is a possibility of causing the fineness deterioration by the prolonged use in the(high temperature) humidity environment(60% or more).
Note4: In the operating temperature item, the low temperature side is the ambient temperature regulations. The high temperature side is the panel surface temperature regulations.

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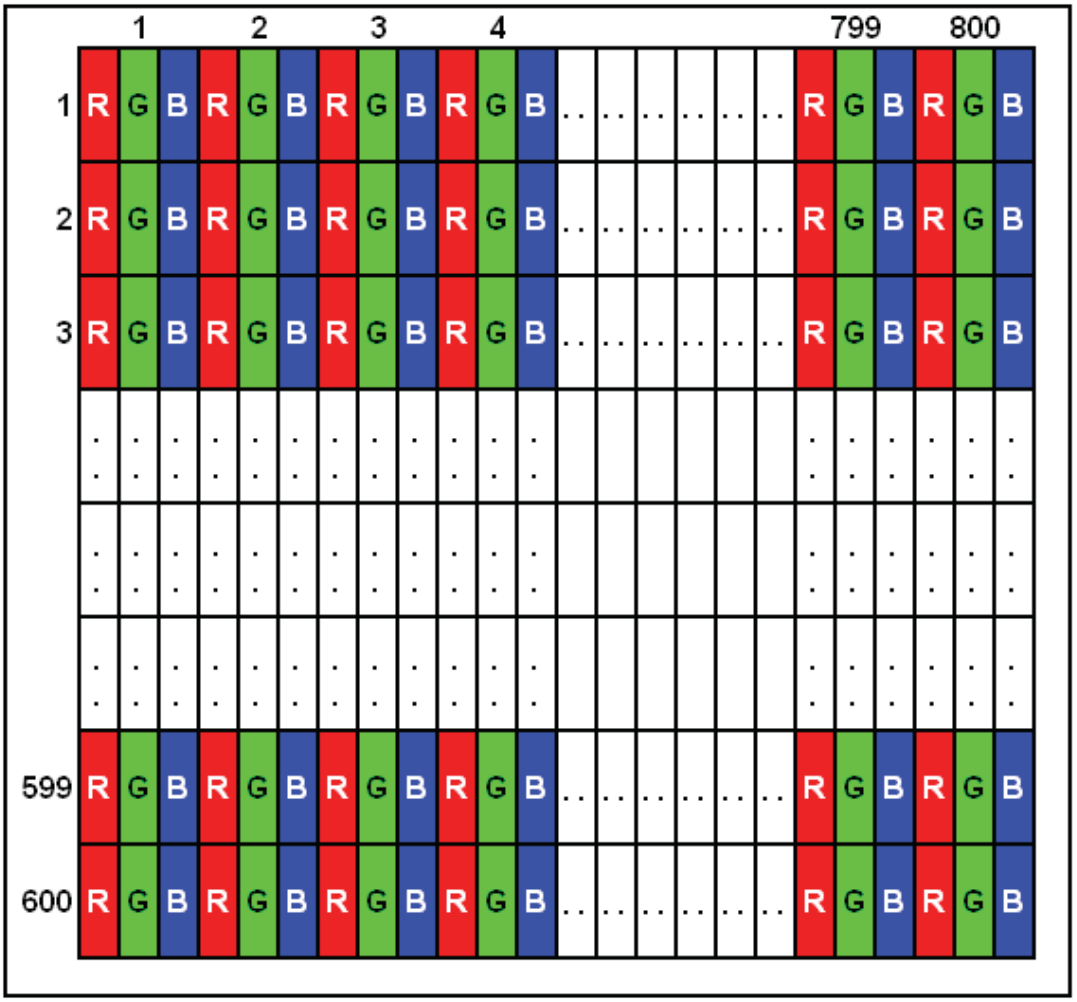
3.0 Pixel Format Image

Figure 2 shows the relationship of the input signals and LCD pixel format image.

Figure 2 Pixel Format



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4.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes

Table 2 Optical Characteristics

Item	Condition		Specification			
			Min.	Typ.	Max.	Note
Viewing Angle [degrees] K=Contrast Ratio>10	Horizontal	θ_L	70	80	-	A, B,D
		θ_R	70	80	-	
	Vertical	θ_T	50	60	-	
		θ_B	70	80	-	
Contrast Ratio	Center		500	800	-	B,D
Response time	Tr		-	7	-	C,D
	Tf		-	23	-	
	Tr + Tf		-	30	-	
Color Chromaticity (CIE 1,931)	Red	x	-0.03	0.580	+0.03	D
	Red	y		0.330		
	Green	x		0.325		
	Green	y		0.600		
	Blue	x		0.155		
	Blue	y		0.100		
	White	x	0.250	0.300	0.350	
	White	y	0.265	0.315	0.365	
White Luminance [cd/m^2]	Center		350	450	-	D
White Uniformity [%]	5Points		75	-	-	E

*The measurement shall be executed 30 minutes after lighting at rating.

The optical characteristics shall be measured in a dark room or equivalent state with the method shown in below.

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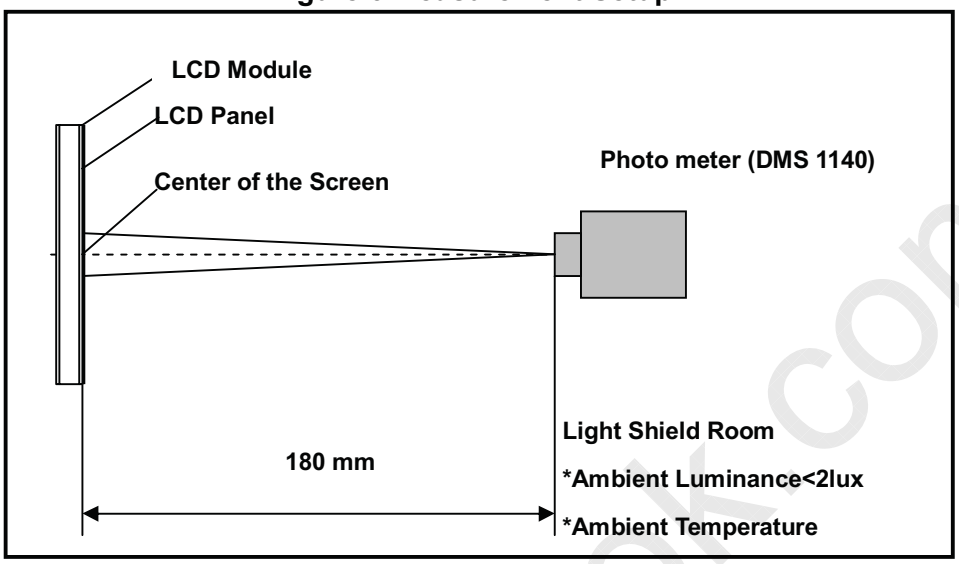
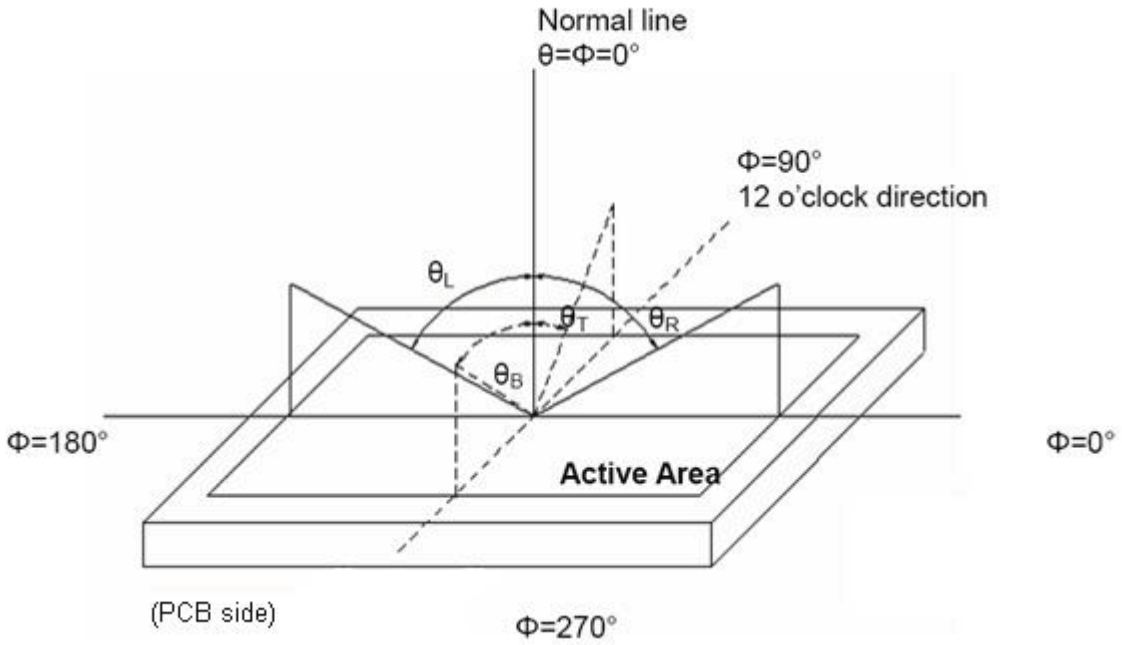
Figure 3 Measurement Setup



Note A: Definitions of viewing angle range

Figure 4 Definition of Viewing Angle



Note B: Definition Of Contrast Ratio (CR)

The contrast ratio is defined as the following

Contrast Ratio (CR) = Luminance with all pixels white / Luminance with all pixels black

Note C: Definition Of Response Time (T_R, T_F)

The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”

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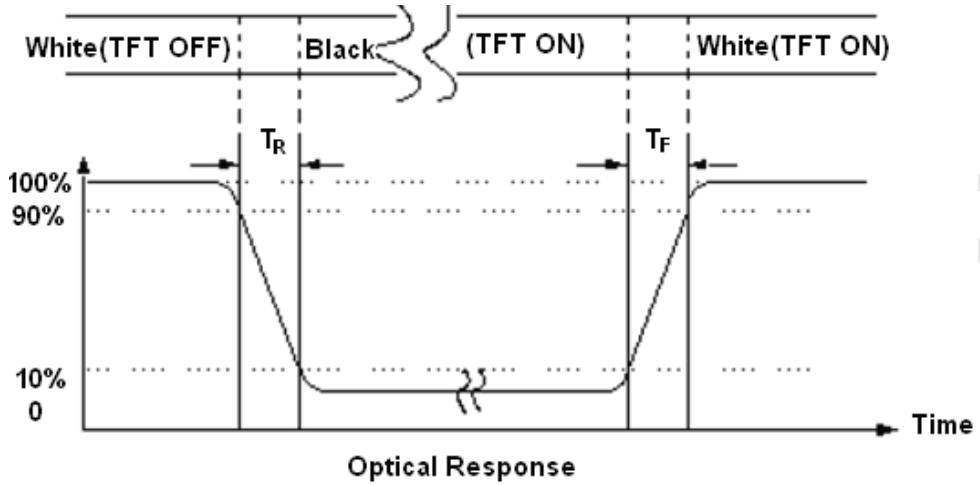
Figure 5 Definition of Response Time



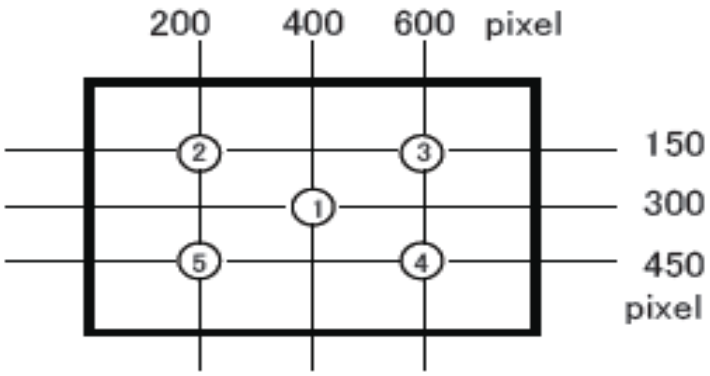
Note D: This shall be measured at center of the screen.

Note E: Definition Of white uniformity

White uniformity is defined as the following with five measurements

$$\text{Luminance uniformity} = \frac{(\text{Min Luminance of 5 points})}{(\text{Max Luminance of 5 points})} \times 100\%$$

Figure 6 Measurement Locations



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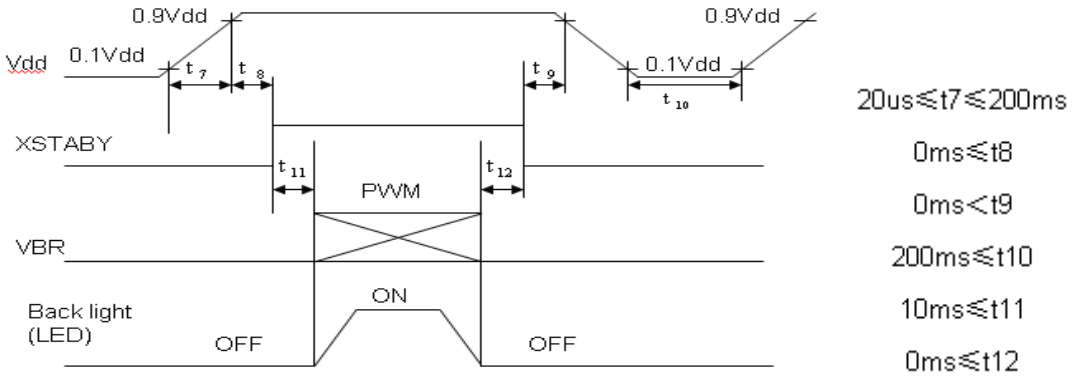
5.0 Backlight Characteristics

5.1 Parameter Guideline Of LED Backlight

Table 3 Parameter Guideline for LED Backlight

Parameter		Symbol	Min	Typ.	Max.	Units	Condition
Supply voltage		VDD	10.2	12	13.8	[V]	Note A
Current dissipation		IDD	-	570	670	mA	Note B
Permissive input ripple voltage		V_{RP_BL}	-	-	200	mVp-p	VDD=12V
XSTABY	High voltage	V_{IH_BL1}	2.4	-	VDD	V	Note C
	Low voltage	V_{IL_BL1}		-	0.2	V	
PWM frequency		f_{PWM}	200	-	1K	Hz	Note D,E
PWM duty		D_{PWM}	10	-	100	%	Note D,E
VBR	High voltage	V_{IH_BL2}	2.1	-	VDD	V	Note D
	Low voltage	V_{IL_BL2}	-	-	0.8	V	
Life Time		L	50,000	-	-	Hours	Note F

Note A: On-off conditions for supply voltage



Note B: Current dissipation

Typ. Value: VDD=+12V, Duty=100%

Max. Value: VDD=10.2V, Duty=100%

Note C: Backlight ON/OFF signal(connected by the pull-down resistor of 10K∩

Note D: PWM signal(connected by the pull-down resistor of 10K∩)

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Note E: PWM

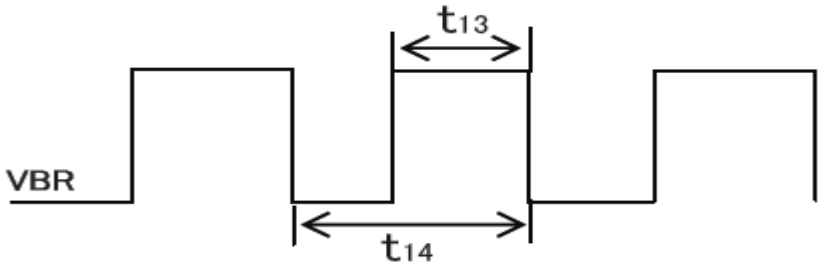
F_{PWM}=1/t14

Duty 10%: Min. Luminance(0%:LED OFF)

Duty 100%: Max. Luminance

Luminance changes in proportion to the duty ratio.(t13>=10us)

When the frequency slows, the display fineness might decrease.



Note F: Luminance becomes 50% of an initial value. (Ta=25℃,PWM=100%)

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6.0 Electrical Characteristics

6.1 TFT LCD panel driving

CN1(Interface signals and +3.3V power supply)

Using connectors: 076B20-0048RA-G4 (Starconn) or similar type.

Corresponding connectors:FI-SE20M or FI-S20S(Japan Aviation Electronics Industry Co., Ltd)

Table 4 Signal Pin Assignment

Pin #	Symbol	Function	Remarks
1	Vcc	+3.3V Power supply	-
2	Vcc	+3.3V Power supply	-
3	GND	GND	-
4	GND	GND	-
5	RxIN0-	LVDS receiver signal CH0(-)	LVDS
6	RxIN0+	LVDS receiver signal CH0(+)	LVDS
7	GND	GND	-
8	RxIN1-	LVDS receiver signal CH1(-)	LVDS
9	RxIN1+	LVDS receiver signal CH1(+)	LVDS
10	GND	GND	-
11	RxIN2-	LVDS receiver signal CH2(-)	LVDS
12	RxIN2+	LVDS receiver signal CH2(+)	LVDS
13	GND	GND	-
14	CK IN-	LVDS receiver signal CK(-)	LVDS
15	CK IN+	LVDS receiver signal CK(+)	LVDS
16	GND	GND	-
17	NC	Non connection	-
18	RL/UD		-
19	GND	GND	-
20	GND	GND	-

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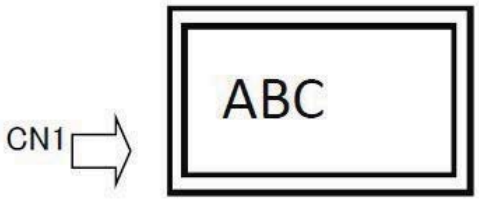
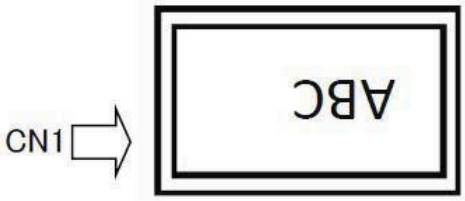
6.1.1 RL/UD drawing

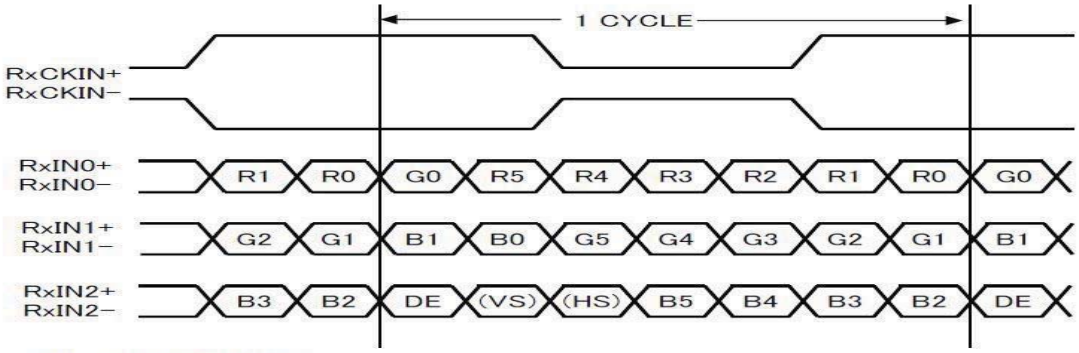
RL/UD=LOW



RL/UD=HIGH

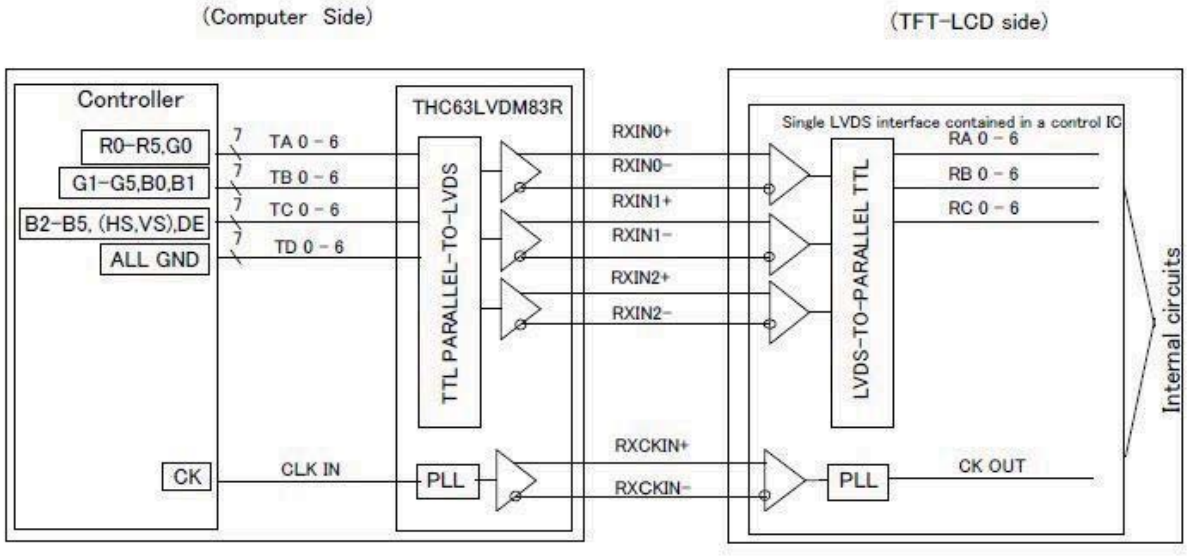


6.1.2 Signal Drawing



DE : DATA ENABLE
HS : Hsync
VS : Vsync
NA : Non Available

6.1.3 Interface block diagram



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6.2 LED backlight connector

CN2 Used connector: SM06B-SHLS-TF(J.S.T.Mfg.Co.Ltd)

or Similar type

Corresponding connector: SHLP-06V-S-B

Table 5 LED Power Pin Assignment

Pin #	Symbol	Function
1	VDD	+12V Power supply
2	VDD	+12V Power supply
3	GND	GND
4	GND	GND
5	XSTABY	LED ENABLE PIN
6	VBR	SYSTEM PWM SIGNAL INPUT

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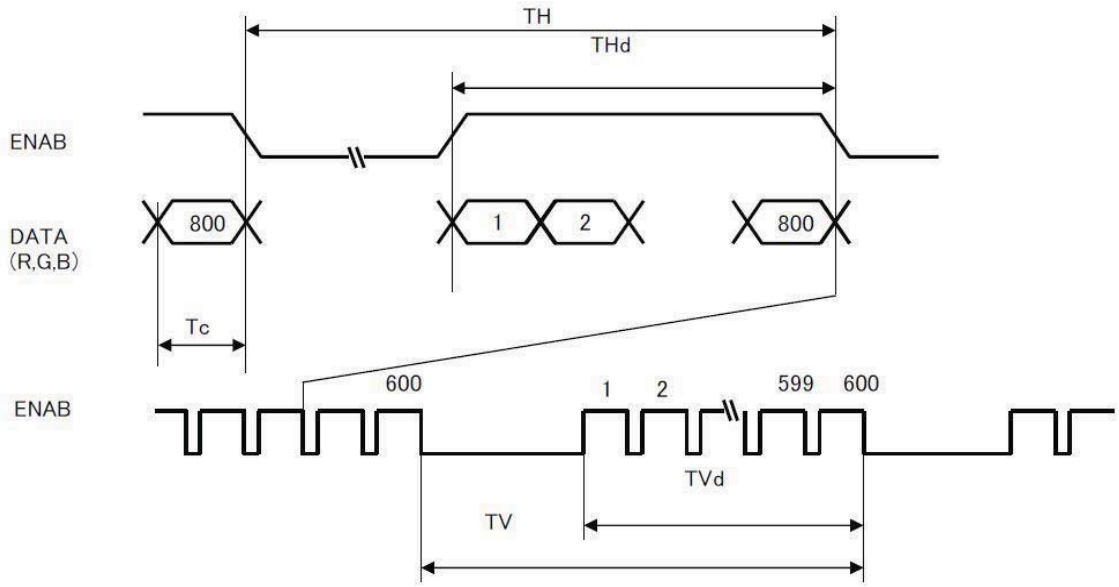
7.0 Interface Timings

7.1 Timing Characteristics

Table 6 Interface Timings

Parameter	Symbol	Min	Typ	Max	Unit
DCLK Frequency	1/Tc	35	40	42	MHz
Horizontal Display Area	thd		800		DCLK
H Total Time	th	940	1056	1395	DCLK
H Active Time		23.5	26.4	39.9	us
Vertical Display Area	tvd		600		Line
V Total Time	tv	628	666	798	line
V Active Time		-	16.7	-	ms

Note: In case of using the long vertical period, the deterioration of display quality, flicker etc. may occur.



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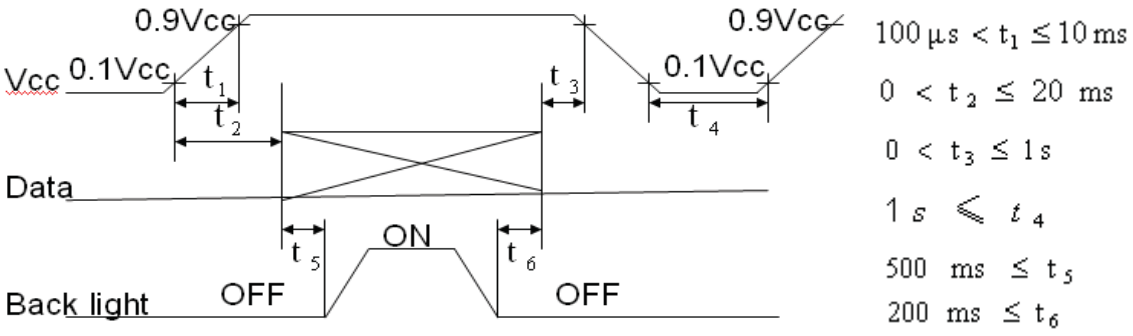
8.0 Power Consumption

Input power specifications are as follows.

Table 7 Power Consumption

Parameter		Symbol	Condition	Min.	Typ.	Max.	Units	Condition
Supply voltage		Vcc		3.0	3.3	3.6	[V]	Note1
Current dissipation		Icc	Vcc=3.3V	-	270	350	[mA]	Note2
Input voltage width for LVDS receiver		V_L		-	-	2.4	[V]	
Permissive input ripple voltage				-	-	200	mVp-p	Vcc=3.3V
Differential input Threshold voltage	High	V_{TH}		-	-	Vcm+100	mV	Vcm=1.2V Note3
	Low	V_{TL}		Vcm-100	-	-	mV	
Input voltage		V_{IH}		2.1	-	-	V	Note4
		V_{IL}		-	-	0.8	V	
Input reak current		I_{OH}		-	-	400	uA	VI2=+3.3V, Note4
		I_{OL}		-10	-	+10	uA	VI2=0V,Note4
Terminal resistor		R_T		-	100	-	Ω	Differential input

Note 1: On-off condition for supply voltage



$100\,\mu s < t_1 \le 10\,ms$

$0 < t_2 \le 20\ ms$

$0 < t_3 \le 1\,s$

$1\,s \leqslant t_4$

$500\ ms \le t_5$

$200\ ms \le t_6$

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Vcc-dip Condition

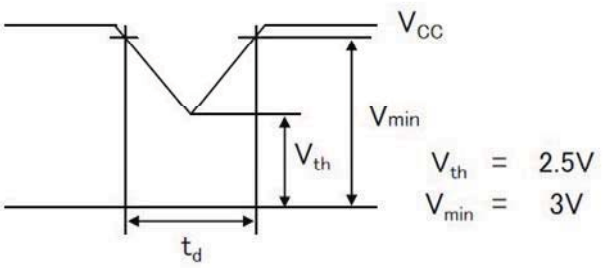


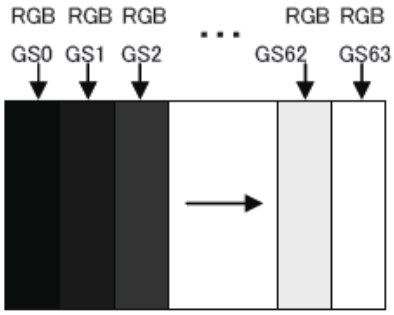
Figure 7 Vcc Power Dip

If $V_{TH} < V_{cc} \leq V_{min}$, then $t_d \leq 10ms$; When the voltage return to normal our panel must revive automatically.

If Vcc< Vth , then Vcc-dip conditions should also follow the On-off conditions for supply voltage. Hsync/Vsync need not be input so that this model may drive only by the ENAB signal. Even if Hsync/ Vsync is input, it doesn't become a malfunction.The relation between the data input and the backlight will recommend the above-mentioned input sequence. When the backlight is turned on before the panel operates, there is a possibility of abnormally displaying. The liquid crystal module is not damaged.

Note2: Current dissipation

Typical current situation: 64-gray-bar pattern (Vcc=3.3V, fck=40MHz,Ta=25℃)



Note3: Vcm: LVDS Common mode voltage

Note4: RL/UD

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9.0 Mechanical Characteristics

9.1 Outline Drawing

Figure 8 Outline Drawing (Front Side)

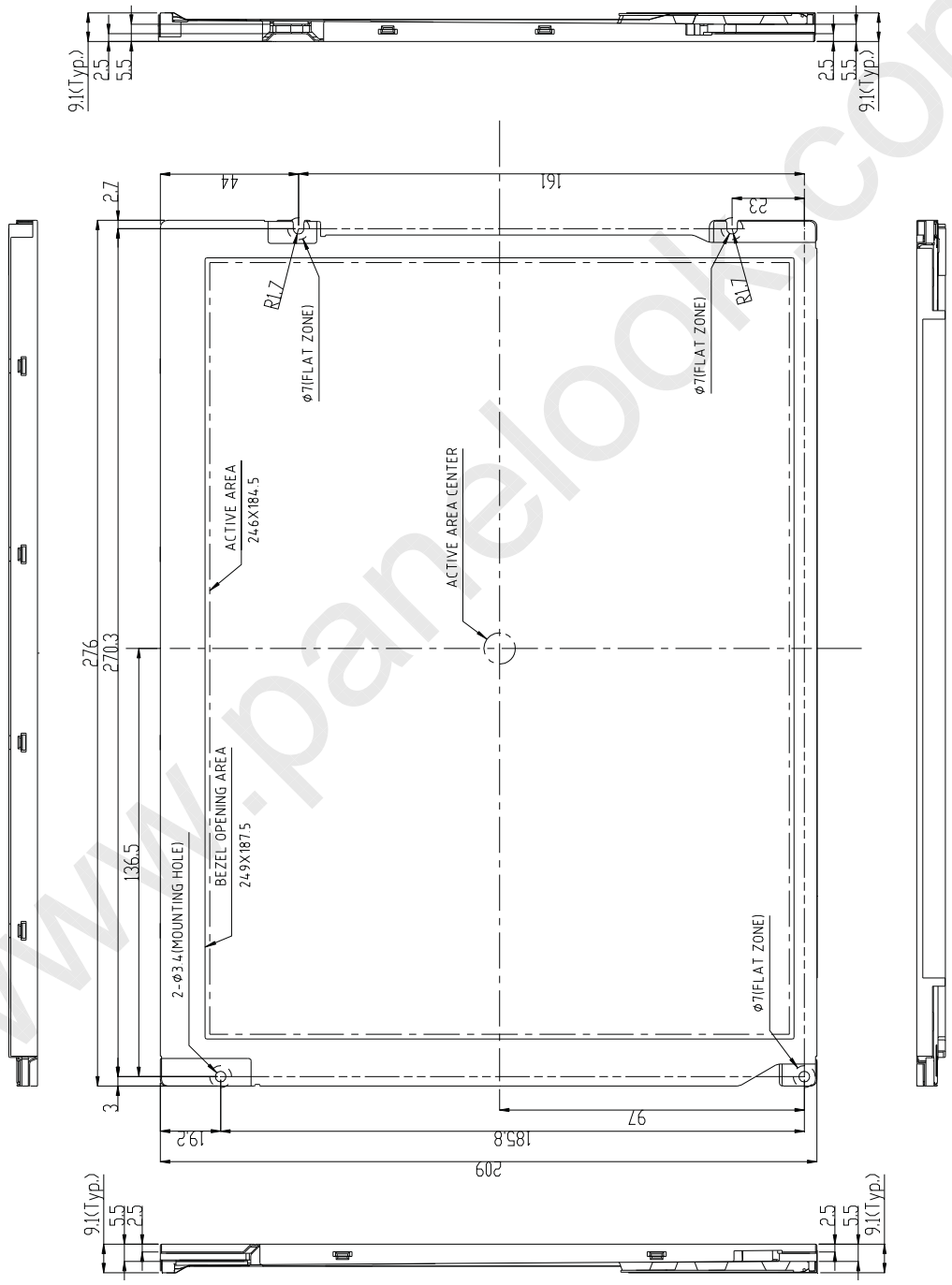

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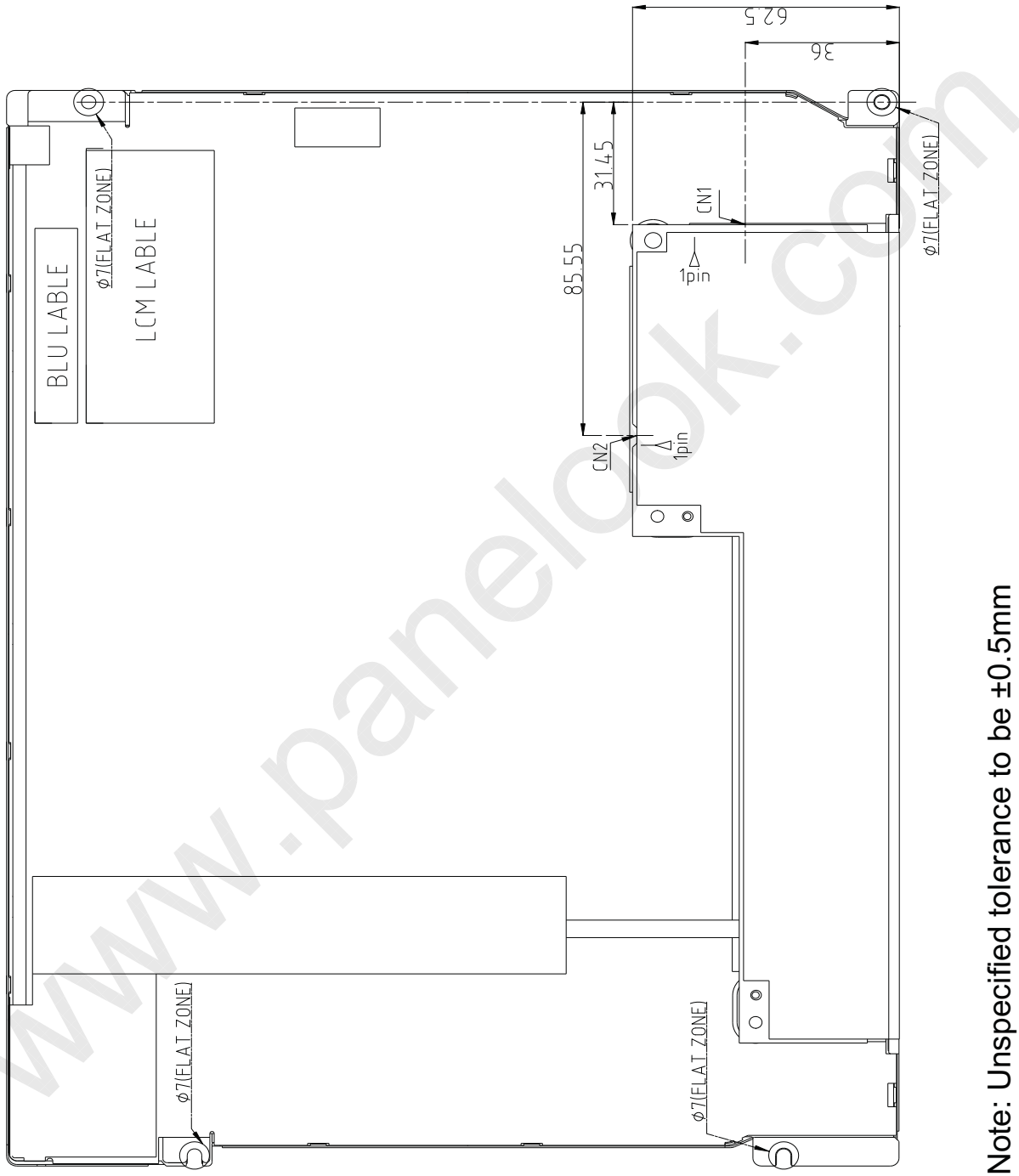
Figure 9 Outline Drawing (Back Side)



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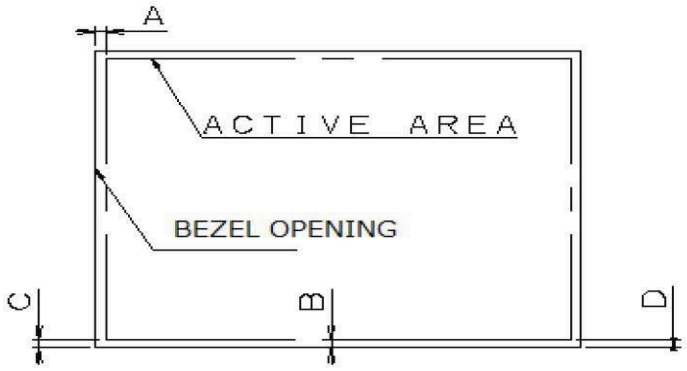
9.2 Active area & Bezel opening drawing



9.3.1. Tolerance x-direction A: 1.5±0.5

9.3.2. Tolerance y-direction B: 1.5±0.5

9.3.3. Obliquity of Display Area |C-D| <0.5

9.3 Dimension Specifications

Table 8 Module Dimension Specifications

Width [mm]	276.0±0.5
Height [mm]	209.0±0.5
Thickness [mm]	9.1±0.5
Weight [g]	700 Max
Unspecified tolerance to be ±0.5mm	

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10.0 Reliability

Item	Package	Test Conditions	Conditions
High Temperature Storage Test	Module	Ambient temperature 80℃,500H	Note1
Low Temperature Storage Test	Module	Ambient temperature -30℃, 500hrs	Note1
High Temp./High Humidity Storage Test	Module	Ambient temperature 50℃, Humidity 95%, 500hrs (No condensation)	Note1
High Temperature Operation Test	Module	Panel surface 70℃, 500hrs	Note1
Low Temperature Operating Test	Module	Ambient temperature -20℃, 500hrs	Note1
High Temp./High Humidity Operation Test	Module	Ambient temperature 50℃, Humidity 85%, 500hrs (No condensation)	Note1
Image Sticking Test	Module	Ambient temperature 25℃, 24H	Note1
Thermal shock test	Module	-30℃~80℃, 1hr/each cycle, 200cycles	Note1
Altitude Test	Module	40℃, 55kPa, 300H, Altitude Site level to 16K feet	Note1
Pressure Test	Module	3kg/60sec	Note1
ESD Test	Module	Operating Contact ±8kV Operating Air ±15kV Non-Operating Contact ±10kV Non-Operating Contact ±20kV	Note1
Vibration Test	Module	1.5 G,10~500Hz, x, y, z each axis/1h	Note1
Shock Test	Module	Half Sine Wave 70G 11ms, ±X,±Y,±Z 1 times each axis	Note1
Vibration Test (no-operating)	With package	1.5 G,10~500Hz, x, y, z each axis/1h	Note1
Drop Test		65cm, 1corner, 3arris, 6side	Note1
Note1: Under the display quality test conditions with normal operation state, these shall be no change which may affect practical display function.(normal operation state:Temperature:15~35℃,Humidity:45~75%,Atmospheric pressure:86~106kpa)			

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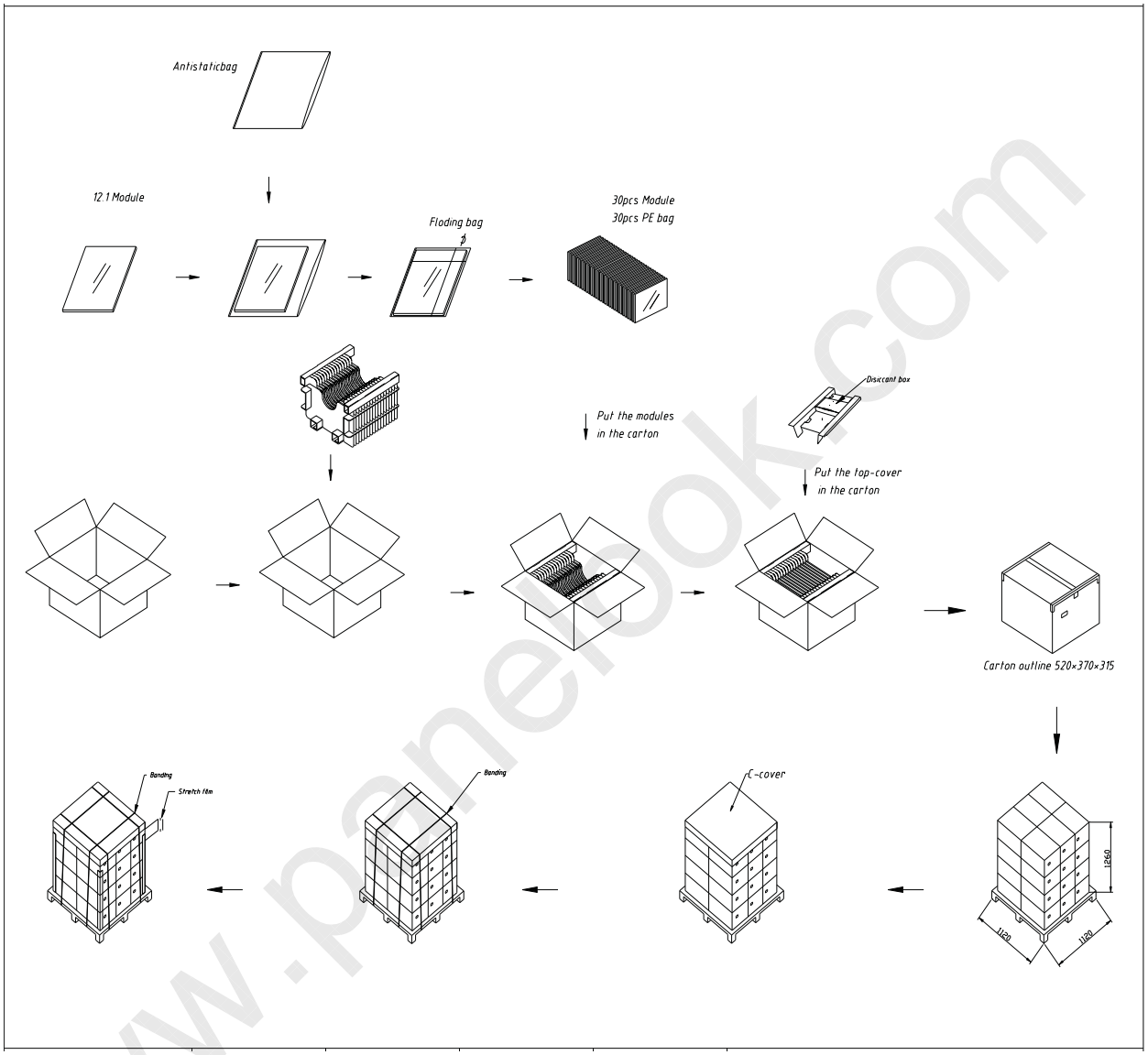
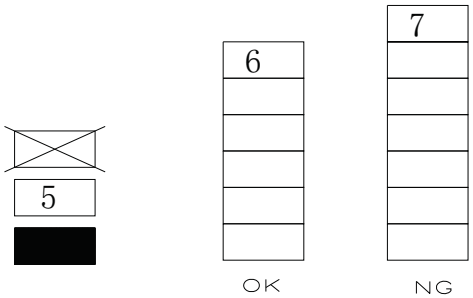
11.0 Package Specification



Components Material	Carton	PE Bag	Module	Protect film	Weight		
Material Size(mm)	520*370*315	295*260*0.06	276*209*9.1	254*194*0.08	675g/pcs module(typ) 700g/pcs module(max)	23Kg/Carton(typ) 25.5Kg/Carton(max)	575Kg/Pallet(typ) 633Kg/Pallet(max)
Amount	1Pcs/Carton	30pcs/Carton	30pcs/Carton	30pcs/Carton	1Pcs Module	30Pcs Module (include packing)	720Pcs Module (include packing)



Piling number of cartons: Max 6

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12.0 Lot Mark

12.1 Lot mark

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Code 1: Production grade.

Code 2: ME material collocation, as production P/N No.11 code.

Code 3: define Module factory code.

Code 4:IVO internal flow control code.

Code 5:Production's BOM sort, EBOM and MBOM.

Code 6: define Cell factory code.

Code 7~11:Project code.

Code 12~15:Production Year ,Month, Date.

Code 16: Production line.

Code 17~20: Serial Number.

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13.0 General Precaution

13.1 Use Restriction

In case of using the device for life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic, take into consideration that appropriate measures such as fail-safe functions and redundant system design should be taken.

13.2 Handling Precaution

(1) Be sure to turn off the power supply when inserting or disconnecting the cable.

(2) Since the front polarizer is easily damaged, pay attention not to scratch it.

(3)Wipe off water drop immediately. Long contact with water may cause discoloration or spots.

(4)When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

(5)Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.

(6)Since CMOS LSI is used in this module, take care of static electricity and injure the human earth when handing. Observe all other precautionary requirements in handling components.

(7)Since there is a circuit board in the module back, stress is not added at the time of a design assembly. Please make it like. If stress is added, there is a possibility that circuit parts may be damaged.

(8)It causes an irregular display and the defective indication, etc., when always put constant pressure on the back of the module. Please do not make the structure to press the back of the module.

(9) Do not expose the LCD panel to direct sunlight. Lightproof shade etc. should be attched when LCD panel is used under such environment.

(10) Connect GND to stabilize against EMI and external noise.

(11)When handling LCD modules and assembling them into cabinets, please avoid that long-terms storage in the environment of oxidization or deoxidization gas and the use of such materials as reagent, solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and discoloration of the modules. Do not use the LCD module under such environment.

(12)When the module is installed, please take care not to pull and to hang LED_FFC.

(13)Liquid crystal contained in the panel may leak if the LCD is broken. Rinse it as soon as possible if it gets inside your eye or mouth by mistake.

(14)Be careful when using it for long time with fixed pattern display as it may cause accidential image.

(15) Adjusting volume have been set optimally before shipment, so do not change any adjusted value. If adjusted value is changed, the specification may not be satisfied.

(16)If a minute particle enters in the module and adheres to an optical material, it may cause display non-uniformity issue, etc. Therefore, fine-pitch filters have to be installed to cooling and inhalation hole if you intend to install a fan.

(17)An abnormal display by changing in quality of the polarizing plate might occur regardless of contact or no contact to the polarizing plate, because of epoxy resin(amine system curing agent) that comes out from the material and the packaging material used for the set side, the silicon adhesive(dealcoholization system and ozime system), and the tray blowing agents(azo-compound), etc. Please confirm adaptability with your employed material.

(18)The polarizer surface on the panel is treated with Anti-Glare for low reflection. In case of attaching protective board over the LCD, be careful about the optical interface fringe etc. which degrades display quality.

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(19)Notice: Never take to pieces the module, because it will cause failure. Please do not peel off the Black tape pasted to the product.

(20)When install LCD modules in the cabinet, please tighten with" torque=0.294±0.02N.m(3.0±0.2kgf.cm)

13.3 Storage Precaution

(1) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

(2) The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

(3) The module should be stored in a dark place. It is prohibited to apply sunlight or fluorescent light in storage.

13.4 Operation Precaution

(1) Do not connect or disconnect the module in the "Power On" condition.

(2) Power supply should always be turned on/off by 12.1 "Power on/off sequence"

(3) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference should be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

(4) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.

13.5 Others

(1) Ultra-violet ray filter is necessary for outdoor operation.

(2) Avoid condensation of water which may result in improper operation or disconnection of electrode.

(3) If the module keeps displaying the same pattern for a long period of time, the image may be "sticked" to the screen.

(4) This module has its circuitry PCB's on the rear side and should be handled carefully in order not to be stressed.

14.6 Disposal

When disposing LCD module, obey the local environmental regulations.

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